ZERNIKE INSTITUTE COLLOQUIUM

Thursday, January 7th, 2016

16:00h, Lecture Hall: 5111.0080 **Coffee and cakes from 15:30h**

Functional Polyphenolic Materials Inspired by Mussels, Tea, Wine, and Chocolate

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Polyphenols are found in both plant and animal tissues, where they serve a variety of functions including mechanical adhesion, structural support, pigmentation, radiation protection, and chemical defense. In animals, polyphenols are found in the adhesive proteins secreted by sessile marine organisms. In mussels, the adhesive proteins are known to contain high levels of 3,4-dihydroxy-L-alanine (DOPA), an amino acid that is believed to be important in adhesion to substrates. In plants, polyphenolic compounds containing benzenediol (catechol) and/or benzenetriol (gallol) functional groups are widely distributed secondary metabolites with a variety of biochemical and physical functions. Consumption of foods and beverages rich in polyphenols are claimed to be beneficial to one's health.

This talk will focus on selected biological polyphenols that are rich in catechol or gallol functional groups, with the goal of developing novel materials inspired by biological polyphenols. In the case of mussel-inspired biomaterials, we are interested in understanding the molecular and mechanochemical aspects of mussel adhesion, and in developing biomimetic polymer hydrogels and coatings from synthetic catechol containing polymers. Mussel-inspired polymers have a variety of functional uses, including tissue repair, drug delivery and multifunctional coatings.

In the case of plant polyphenols, we recently reported the formation of thin adherent polymerized films on substrates immersed in aqueous extracts of tea, coffee beans, cacao beans and grapes. Deposition is facile on a variety of solid, porous and nanoparticulate substrates composed of metals, ceramics and polymers. In addition to possessing inherent antibacterial and antioxidant properties, the deposited polyphenol films can be employed for plasmonic tuning and surface functionalization of nanoparticles.

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